

Helping the Auto Repair Industry Manage Hazardous Wastes: An Education Project in King County, Washington

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Abstract

From January 1, 2000, to August 31, 2001, a team of environmental health specialists from Public Health–Seattle & King County, a partner in King County's Local Hazardous Waste Management Program, made educational visits to 981 automotive repair shops. The purpose was to give the auto repair industry technical assistance on hazardous waste management without using enforcement action. Through site inspections and interviews, the environmental health staff gathered information on the types and amounts of conditionally exempt small-quantity generator (CESQG) hazardous wastes and how they were handled. Proper methods of hazardous waste management, storage, and disposal were discussed with shop personnel. The environmental health staff measured the impact of these educational visits by noting changes made between the initial and follow-up visits.

This report focuses on nine major waste streams identified in the auto repair industry. Of the 981 shops visited, 497 were already practicing proper hazardous waste management and disposal. The remaining 484 shops exhibited 741 discrepancies from proper practice. Environmental health staff visited these shops again within six months of the initial visit to assess changes in their practices. The educational visits and technical assistance produced a 76 percent correction of all the discrepancies noted.

county governments are responsible for assisting conditionally exempt small-quantity generators (CESQGs) under this State Department of Ecology mandate. CESQGs are businesses that produce less than 220 pounds of hazardous waste a month and do not accumulate more than 2,200 pounds at any given time. By definition, CESQGs are not subject to the requirements of the Washington State Dangerous Waste Regulations (WAC 173-303-070) if they 1) designate their waste in accordance with regulations, 2) manage their waste so that it does not pose a potential threat to human health or the environment, and 3) either treat or dispose of their dangerous waste in an on-site facility, or ensure delivery to an off-site facility. The auto repair industry was chosen for the project reported here because of the number of past hazardous waste complaints received, the availability of industry information, and a need for a large sample to evaluate industry-wide practices. This industry is one in a series of industries that have received similar services since 1992.

Introduction

The Local Hazardous Waste Management Program (LHWMP) is a multi-agency effort mandated by the state of Washington with the goal of keeping hazardous and toxic

materials out of the environment through education and behavioral changes in industries that generate hazardous wastes (LHWMP in King County, 1997; Washington State Department of Ecology, 2000). City and

Method

A team of environmental health specialists (the "Audit Team") from Public Health–Seattle & King County, a partner in the LHWMP of King County, used specific federal Standard Industrial Classification (SIC)

TABLE 1**Waste Generated by 981 Auto Repair Shops in King County, Washington**

	Waste Streams					From Aqueous Parts Washers	From Petroleum Parts Washers		
	Waste Oil	Oil Filters	Shop Towels	Antifreeze	Batteries	Aqueous Solvent	Halogenated Solvent	Non-halogenated Solvent	Unknown Solvent
Number of businesses	903	567	759	668	659	55	43	419	134
Gallons per month	194	—	—	41	—	10	7	9	15
Total gallons per month	175,182	—	—	27,388	—	550	301	3,771	2,010
Items per month	—	116	433	—	9	—	—	—	—
Total items per month	—	65,772	328,647	—	5,931	—	—	—	—
Yearly totals for gallons or items	2,102,184	789,246	3,943,764	328,656	71,172	6,600	3,612	47,252	24,120

codes from a database of King County businesses to create a list of potential businesses to be visited. Businesses with the following SIC codes were included in the study: 5510-01 (car sales with repair), 7539-04 (electrical repair), 7538-00 (general auto repair), 7539-03 (carburetor repair), 5561-02 (RV sales with repair), 7538-01 (auto machine shops), 7533-00 (exhaust systems), 7539-01 (alignment and suspensions), 7539-06 (radiator shops), 7537-00 (transmission repair), and 7539-02 (brake repair) (Executive Office of the President, Office of Management and Budget, National Technical Information Service, 1987). Under these SIC codes, 1,155 auto repair facilities were identified.

Training materials were compiled in preparation for the field visits, including the LHWMP *Hazardous Waste Directory* (2000), the LHWMP *IMEX Materials Listings Catalog* (n.d.), and the Washington State Department of Ecology *Guide for Automotive Repair Shops* (1999). Industry-specific best management practices (BMPs) for proper handling of each waste were developed in accordance with the U.S. Environmental Protection Agency (U.S. EPA) definition and model, which defines BMPs as methods that have been determined to be the most effective and practical means of preventing or reducing pollution (U.S. EPA, n.d.). The Audit Team staff also developed an "Observation and Recommendation" form

to record waste streams, identify disposal methods, and recommend BMPs.

Two major objectives of the study were identified: 1) to gather baseline information on how hazardous wastes were generated and handled by the industry and 2) to evaluate and record changes made between the initial and return visits. The following areas of concern were discussed during visits: hazardous waste disposal, methodology and documentation, stormwater discharge, secondary containment, spill prevention or containment of materials, and labeling of waste containers. The behavioral-change target was set at 75 percent.

The Audit Team sent letters to 1,155 businesses explaining the project. One hundred and seventy-four businesses were removed from the list for the following reasons: out of business or no longer at location (139), not in King County (three), not an auto repair business (24), residential address/no contact with occupants (four), and refused entry (four). (A shop refusing entry to an auditor was still offered written educational materials, and the staff person observed the interior and the exterior of the building for obvious signs of environmental problems.) Subsequently, the Audit Team conducted visits to 981 confirmed auto repair shops between January 1, 2000, and August 31, 2001. Finally, the field data were tabulated and analyzed to evaluate the auto repair industry.

Findings

Waste Stream Analysis

The amount of each hazardous waste stream that was observed on site was quantified and recorded on a hazardous waste checklist. The checklist was used to ensure consistency and accuracy in data gathering. The waste stream information was obtained verbally from the owners or managers, and from waste disposal receipts maintained at the businesses. These data were then transcribed to a data entry form and entered into a computer database. The waste generation rates for King County automotive repair shops are shown in Table 1.

Waste Oil

Oil was the most voluminous waste stream. Overall, 903 auto repair facilities (92 percent) produced waste oil. The average facility generated approximately 194 gallons per month. The industry as a whole generated approximately 175,000 gallons of waste oil per month in King County, which translates to over two million gallons annually (Table 1). Ninety percent of the businesses used a licensed transporter to haul the waste oil off site. Of the 981 shops visited, only 84 shops (8.5 percent) supplemented their building heat by burning waste oil on site (see photo on page 11). The Audit Team was concerned about a possible increase in air pollution



Typical installation of used-oil burner in auto repair shop.

from the burning of used oil. This concern was mitigated, however, by information received from the Puget Sound Clean Air Agency (PSCAA), which authorizes the practice of burning used oil in 500,000-BTU oil heaters in King County. So the two million-plus gallons of used oil generated annually in King County could be a significant resource for heating the businesses in which it is generated.

Oil Filters

Oil filters are not regulated as a hazardous waste if they are properly punctured and drained for 24 hours prior to disposal as solid waste, or if they are recycled, a process whereby both oil and steel are recovered. A total of 567 shops (58 percent) reported generating used oil filters. These shops averaged 116 filters per month, creating an annual number in King County of more than 789,000.

An oil filter, even after being drained, contains approximately 250 milliliters (mL), or nearly one cup, of oil. Two hundred and fifty-five of the businesses adequately drained their filters but then disposed of them in their solid waste containers. An annual volume of nearly 355,000 filters was disposed of in this manner. If all oil filters were crushed prior to disposal, an additional 23,000 gallons of waste oil could be recovered annually in King County.

A typical automotive oil filter contains approximately 0.5 pounds of metal. The weight of the oil filters generated in one year in King County is estimated, then, to amount to about 394,600 pounds, or 197 tons, of



Typical aqueous parts washer.

metal. The weight generated by the 255 businesses not engaged in recycling would be about 89 tons. While some of these filters were disposed of in King County, many were sent to landfills in the state of Oregon. If solid waste regulators required that used oil filters be recycled, approximately 89 tons of metal would be removed from the solid waste stream each year.

Used Shop Towels

Most businesses sent used shop towels (woven cloth) to permitted commercial laundry facilities. Six businesses reported laundering towels at home. Home laundering is not recommended because it may expose family members to hazardous materials; also, it is desirable to keep heavy metals and fats, oil, and grease (FOG) out of septic and sanitary sewerage systems (King County Department of Natural Resources—Industrial Waste Section, 2000).

Antifreeze

Six hundred and sixty-eight auto repair shops (68 percent) reported generating waste antifreeze. This waste was generated at an average of 41 gallons a month per business and was usually sent off site to a treatment, storage, and disposal facility. Four hundred eighty one businesses (72 percent) used this method of disposal, while 167 (25 percent) reported processing the coolant on site with commercially available recycling equipment. Twenty businesses (3 percent) stated that they generated very small quantities of waste antifreeze and had never disposed of the material. Among this group, three reported that they took their waste antifreeze to a household hazardous waste collection site,



Typical petroleum parts washer.

and two had at one time or another illegally disposed of their antifreeze into the sanitary sewer system. After they were made aware of the illegal disposal, these businesses claimed to have ceased this activity.

Batteries

Six hundred and fifty-nine shops (67 percent) generated used lead-acid batteries, which contain recyclable materials. Many recyclers accept lead-acid batteries, and handling this waste stream was not considered to be a problem. The biggest issues were safety and secondary containment. Because batteries contain sulfuric acid, any spills could be a possible threat to personnel or to the environment. Businesses were advised to place all of their used batteries in secondary containment holders (containers that were inert to sulfuric acid) and also to maintain a container of sodium bicarbonate for neutralizing any accidental spills.

Parts Washers

Parts washers were divided into two categories according to the liquid they used: aqueous and petroleum-based (see photos above). Of the 981 shops visited, 651 (66 percent) reported using one of these two parts-washing systems (Table 1). Approximately 596 of these (92 percent) washed auto parts in a petroleum-based solvent. The remaining 55 shops used aqueous parts-washing systems, commonly referred to as “spray cabinets” since they resembled industrial-size dishwashers. Traditionally, parts washing in this industry has been done with petroleum-based solvents. Recent innovation in parts washing, however, has resulted in the development of aqueous systems.

TABLE 2

Changes in Waste Management Practices Made by 484 Auto Repair Shops in King County, Washington

	Regulated Activities		BMPs for Hazardous Wastes			
	Hazardous Waste Disposal	Stormwater Discharge	Secondary Containment	Documentation	Spill Materials	Labeling
Number with discrepancies on initial inspection	66	27	299	83	98	168
Number that made correction on follow-up inspection	50	22	215	56	75	118
Percent that made corrections	76	81	72	67	77	70
75% impact objective met?	Yes	Yes	No	No	Yes	No
Regulated average	79%					
BMP average			72%			
Overall average			76%			

The majority of auto repair shops in King County sent their petroleum waste solvent to an off-site facility. Twelve businesses (2 percent) were found to be improperly disposing of the solvent from their parts washers. These businesses either burned the material in a waste oil burner within the facility, evaporated the material by leaving it in an open container, or discharged the solvent to the sanitary sewer. Proper disposal methods were discussed with these businesses. Because the LHWMP is not a regulatory program, continuing violators were referred to agencies with enforcement authority.

Although aqueous parts washers were used less than petroleum-based solvents, they produce a more complex and problematic waste. Waste from aqueous parts washers contains both oily wastewater and a sludge waste that accumulates at the bottom of the machine. Of the 55 businesses that used aqueous parts washers, 36 businesses (65 percent) reported sending this waste (wastewater and sludge) to a licensed treatment facility. Eight businesses (15 percent) recycled the wastes on site, and seven shops (13 percent) said that they never disposed of this wastestream. Four shops (7 percent) admitted that they sent the waste to the sanitary sewer, an unacceptable disposal option. Alternative disposal methods were discussed with the managers.

As auditors documented the uses to which aqueous parts washers were put, questions arose about the disposal of the wastewater and sludge from this equipment. Therefore, wastewater and waste sludge from eight randomly selected auto repair shops in King County were sampled (Christensen, 2002). The wastewater was analyzed for total metals, volatile organic compounds (VOCs), and FOG. The sludge was analyzed for copper, nickel, zinc, and other metals; halogenated organic compounds (HOCs); and pH, according to established parameters and procedures (Washington State Department of Ecology, 1998).

Test results demonstrated that all wastewater samples exceeded the local sewer discharge limit of 100 parts per million for FOG and 50 percent of the samples exceeded the King County industrial-wastewater dangerous-waste limit for lead or cadmium. One water sample exceeded the local discharge limit for arsenic, three exceeded the limit for copper, and six exceeded the limit for zinc. None of the samples showed VOC levels near the regulatory limit.

The sludge fractions of the samples had a pH range of 7.5 to 11.3 and were not considered CESQG hazardous waste by this criterion. One sludge sample did, however, exceed the hazardous waste limit for cadmium. Another sample was classified as a

Washington State "Special Dangerous Waste" for HOCs. Test results were shared with each of the eight businesses, which then modified, if necessary, their disposal practices for wastewater and sludge from spray cabinets.

The above information may be helpful for the regulatory agencies and vendors that provide technical guidance and assistance to this industry as aqueous parts washers become more common.

Impact Analysis

The Audit Team evaluated the impact of its educational visit to a particular shop by evaluating the changes made between the initial audit and the return visit (Table 2). Changes made in the following areas of concern were documented: hazardous waste disposal, methodology and documentation, stormwater discharge, secondary containment, spill prevention, and labeling. A total of 484 automotive repair facilities (49 percent) required more than one visit. Some businesses required multiple visits before improvements were made. Surprisingly, 497 businesses (51 percent) required only the initial visit because they were already handling hazardous waste correctly by using BMPs. The fact that 51 percent of the identified auto repair businesses were in compliance indicates a high level of environmental awareness by this industry.



Inadequate secondary containment of waste antifreeze—potential for spills outside the building.

Hazardous Waste Disposal

Of the 484 auto repair facilities that required follow-up visits, 66 (14 percent) were improperly managing their hazardous wastes. Typically, a shop was not characterizing its sludge or filters prior to disposal in solid waste. Information was given to the business managers about the need for testing and obtaining a waste clearance, which would allow them to legally dispose of the material. Subsequent visits found that 50 shops (76 percent) had changed their behavior in a positive way.

Stormwater and Surface Discharge of Hazardous Wastes

Twenty-seven shops (6 percent) were found to be discharging wash water, antifreeze, waste oil, or other materials to storm drains or directly to the ground surfaces, which jeopardized the water quality of nearby streams or other bodies of water. On the follow-up visits, 22 businesses (81 percent) had made corrections to prevent any future contamination. Five businesses (19 percent) did not alter this method of waste mismanagement, even after subsequent visits by field staff. Field staff referred these businesses to agencies with enforcement authority for follow-up.

Secondary Containment

Providing secondary containment for hazardous waste or hazardous material is a BMP and is not a requirement for CESQGs. The Audit Team recommended this practice, however, in order to prevent hazardous waste from accidentally entering the environment. Many of the businesses stored drums of hazardous waste or material within the shop

building (see photo at left). Most buildings were considered secondary containment, provided that the wastes stored in drums could not spill into a floor drain or outside the shop. Containers should not be stored near a doorway. Some businesses chose to store their waste oil or waste antifreeze outside the building, usually adjacent to the exterior of the building. BMPs included placement of the waste containers on a bermed impervious pad, such as concrete or asphalt. The containers were to be kept under a shelter to prevent rainwater from entering the drums and filling the bermed area. Rainwater could cause the waste to overflow and spill into a nearby stormwater drain or onto the ground.

Nearly 300 businesses were initially found to have deficient secondary containment practices (Table 2). Return visits found that 215 shops (72 percent) had made significant improvements in their secondary containment practices. Eighty-four businesses did not change their practice for the following reasons: cost of making changes, a realization that the changes were just a recommendation and not a requirement, and possible future relocation of the business.

Documentation of Hazardous Waste Disposal

Proper completion of the manifest, receipt, or bill of lading showing proper documentation of waste disposal was recommended to limit the liability of the individual businesses (LHWMP in King County, 1994). Of the 484 businesses requiring follow-up visits, 83 businesses (17 percent) did not have adequate documentation. Fifty-six businesses (67 percent) made improvements in this area. Complete disposal records, including manifests and certificate of destruction, minimize a generator's future liability, although CESQGs are required only to maintain receipts or bills of lading.

Availability of Spill Materials

When hazardous waste spills occur, a business can incur high cleanup costs, possible long-term liability, worker safety issues, and other problems. A fact sheet of basic information on the proper storage of materials, especially chemicals, was provided to the businesses to prevent future spills from occurring (LHWMP in King County, 2000).

Ninety-eight auto repair facilities (20 percent) lacked adequate plans and materials in the event of a hazardous material spill. Seventy-five businesses (77 percent) corrected this discrepancy by the time of subsequent visits.

Labeling of Hazardous Waste Containers

Initial inspections showed that 168 shops (35 percent) were not properly labeling their waste drums. Washington State Department of Labor and Industries requires that containers with hazardous materials or wastes be labeled or marked with the identity of the contents (State of Washington, Department of Labor and Industries, 2000). Follow-up inspections found that 118 shops (70 percent) had corrected this discrepancy.

Conclusion

A total of 1,155 businesses were identified in 1999 as auto repair facilities. From the list, 174 businesses were excluded for the following reasons: out of business, out of King County, not an auto repair business, residential address/no contact with occupants, or refused entry. The remaining 981 were visited between January 1, 2000, and August 31, 2001. During the initial visits conducted by the Audit Team, 497 businesses (51 percent) were identified as using proper waste management and disposal practices. The other 484 shops (49 percent) needed further assistance and visits. The fact that 51 percent of the auto repair shops were already in compliance indicated a high level of environmental awareness by this industry. Follow-up visits were conducted at the 484 shops that exhibited the discrepancies identified in Table 2. The educational visits and technical assistance produced a 76 percent correction of the discrepancies noted, and in addition, hazardous waste management and disposal practices were markedly improved. Thus, this auto repair project demonstrated that direct outreach to the community, wide distribution of necessary educational materials, and eliciting of cooperation can positively change hazardous waste management practices. The effort also indicated the importance of business and government collaboration in pollution prevention. 🐸

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Source: Anchorage Convention and Visitors Bureau

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